NIGERIA

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I. GENERAL COUNTRY PROFILE

A. Geography and Population

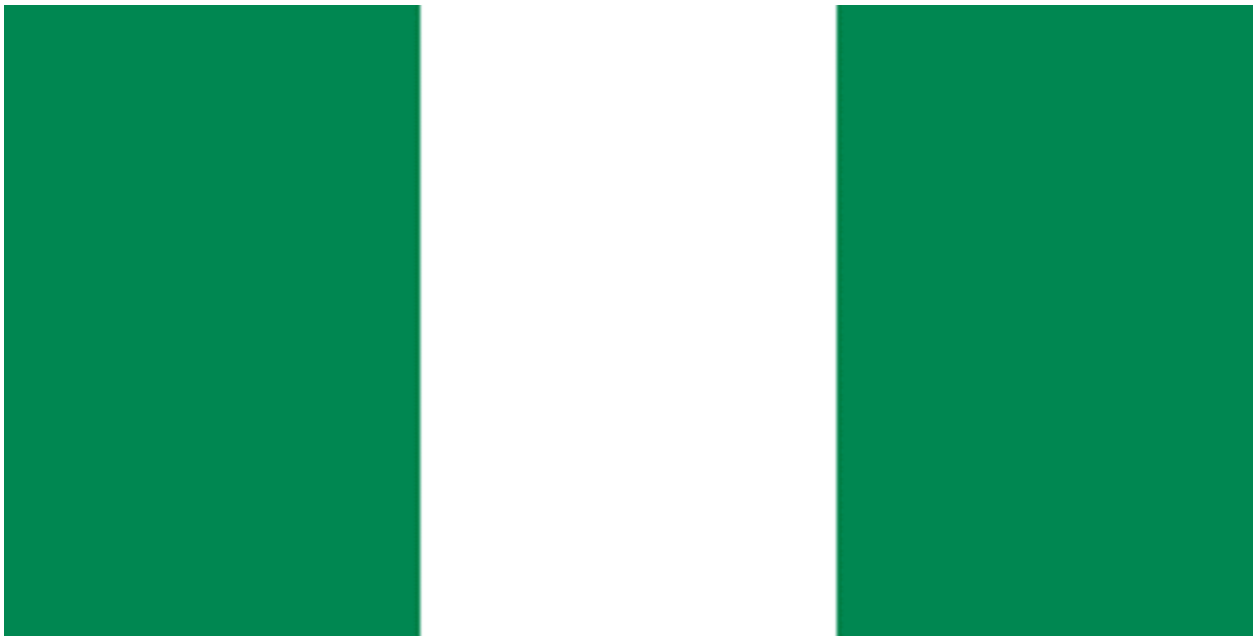


Figure 1. National flag of Nigeria. *Source:*[2]

Nigeria, officially the Federal Republic of Nigeria, is located along the West African coast (Latitude – 4 and 14 degrees north; Longitude – 2 and 15 degrees east).[1] It is the most populous country in Africa and has the continent's largest economy.[2] The country spans approximately 923,768 square kilometres (356,668 square miles) and features an 853-kilometre (530-mile) coastline along the Atlantic Ocean.[1] Its territorial waters extend 12 nautical miles offshore.[2] Nigeria shares land borders with Niger and Chad to the north, Benin to the west, Cameroon to the east and the gulf of guinea to the south.[1] The national flag, consisting of green and white vertical stripes (Figure 1), symbolizes the country's agricultural wealth and aspirations for peace and unity.[3]

Nigeria's diverse geography contributes to a wide range of climatic patterns.[4] The country can be broadly divided into northern plains, central hills and plateaus, and southern lowlands, each associated with distinct environmental conditions.[4] These features shape Nigeria's major biomes, which transition from coastal swamps and tropical rainforests in the south to savanna and semi-arid regions in the north.[4]

Nigeria's hydrology is dominated by two major river systems (Figure 2): the Niger River and its principal tributary, the Benue River.[5] The Niger River originates in the Guinea Highlands of southeastern Guinea and initially flows northeast toward the Sahara before turning southeast and ultimately draining into the Atlantic Ocean via the Niger Delta.[5] The Benue River arises from the Adamawa Plateau in Cameroon and joins the Niger River in central Nigeria.[5]

Figure 2. Map of Nigeria. *Source:*[2]

Nigeria's population is rapidly expanding, with projections estimating a 58% increase by 2050 (Figure 3).[6] Abuja, the federal capital, is centrally located and has an estimated population of 3.8 million. Lagos State, situated southwest of Abuja, is the most populous region in the country, with approximately 15.9 million residents – nearly twice the population of the Federal Capital Territory.[2] Other major urban centres include Kano (4.3 million), Ibadan (3.4

million), Port Harcourt (3.4 million), and Benin City (1.9 million).[2] Table 1 summarizes key demographic and geographic characteristics of Nigeria.

Table 1. Overview of Nigeria[6-8]

Category	Value
Capital	Abuja
Largest city	Lagos
Total population	233 million
Global population rank	6
Population living in rural areas	37%
Total Area	923,768 km² (356,668 mi²)
Gross national income per capita	USD 1,880
Life expectancy at birth (M/F)	63 years
Infant mortality rate	69 deaths per 1,000 live births
Health expenditure per capita	USD 220.44
Health expenditure (% of GDP)	4.06%
Human Development Index (HDI)	0.548

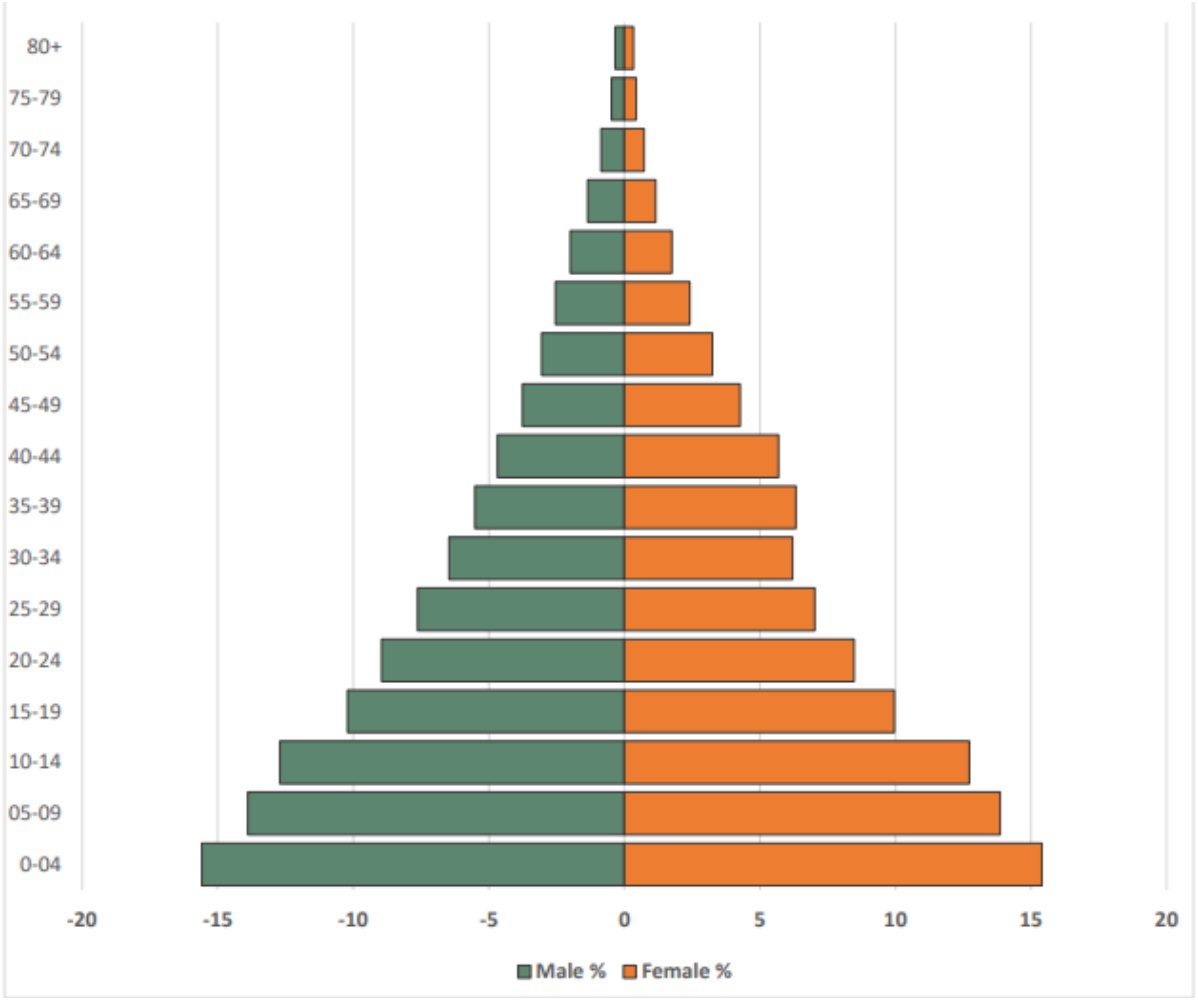


Figure 3. Age-sex population pyramid of Nigeria. *Source:*[9]

B. Culture and History

Nigeria is characterized by extensive ethnic and linguistic diversity, with over 250 ethnic groups.[3] The three largest groups – the Hausa/Fulani (36%), Yoruba (15.5%), and Igbo (15.2%) – constitute the majority of the population.[1] Other notable groups include the Ijaw (1.8%), Kanuri (2.4%), Ibibio (1.8%), and Tiv (2.4%).[1] Although English is the official language, more than 500 indigenous languages are spoken across the country.[3]

Religious affiliation is relatively evenly distributed between Islam (46.3%) and Christianity (45.8%), with Islam predominating in the north and Christianity in the south.[10] A small proportion of the population (7.6%) practices traditional religions.[10]

Nigeria's political development is closely tied to its colonial history.[1] The modern state was formed in 1914 through the unification of three British-administered territories: the Lagos Colony (annexed in 1861), the Southern Protectorate (established between 1885 and 1894), and the Northern Protectorate (brought under British control in 1903).[11]

Subsequent political reforms aimed to increase local representation. Between 1922 and 1947, policies promoting regional participation were introduced, culminating in the 1954 constitution, which established a federal system of regional governments.[1] This framework set the stage for Nigeria's first federal elections in 1959.[11]

Nigeria gained independence from the United Kingdom on October 1, 1960, and became a republic in 1963 while remaining within the British Commonwealth.[12] The post-independence period was marked by political instability, including a military coup in 1966.[12] In 1967, the attempted secession of the Eastern Region (Biafra) under Colonel Odumegwu Ojukwu led to the Nigerian Civil War, which ended in 1970 after they surrendered to Colonel Olusegun Obasanjo .[11]

Efforts to restore civilian governance were repeatedly delayed, and military rule persisted until 1975, when a new constitution was enacted and democratic elections were held.[11] However, this period of civilian rule was short-lived, ending with another military coup in 1983.[11]

Nigeria remained under military rule for the next 16 years.[1] The regime of General Sani Abacha (1993–1998) was marked by widespread human rights abuses, suppression of political opposition, and institutional instability.[11] Following Abacha's death in 1998, General Abdulsalami Abubakar initiated a transition to civilian rule, and the adoption of a new constitution culminating in the 1999 elections where Chief Olusegun Obasanjo emerged as the civilian president.[11]

C. Government and Legal System

Nigeria is a federal republic comprising 36 states and the Federal Capital Territory (FCT).[1] Similar to the United States, it operates under a decentralized system of governance in

which states retain a degree of autonomy, although their authority is ultimately limited by the federal government.[2] Officials are elected at both the federal and state levels.

The executive arm of government is presided over by the president, who concurrently occupies the dual offices of head of state and head of government.[13] The president oversees the Federal Executive Council, which includes the vice president and functions as the national cabinet.[13] The president is elected by popular vote to a four-year term and is eligible for one re-election.[13]

Legislative authority in Nigeria is exercised by the National Assembly, a bicameral institution composed of the Senate and the House of Representatives.[13] The Nigerian Senate comprises 109 elected legislators, each serving as the representative of one of the country's senatorial districts.[13] The Federal House of Representatives is constitutionally composed of a total of 360 members, each elected to represent a distinct constituency.[13]

The judicial hierarchy is organized with the Supreme Court serving as the highest authority, followed in order by the Court of Appeal and the High Court operating at both federal and state levels.[13] The Nigerian legal system embodies a dual structure, comprising both English law and indigenous customary law.[14] Islamic law predominantly applied in the northern regions is formally classified under the category of customary law, despite its non-indigenous origins.[14]

According to the World Bank's Worldwide Governance Indicators (Figure 4), Nigeria ranks highest in Voice and Accountability (20th-40th percentile), although this remains below the global average. In contrast, its lowest performance is in Political Stability and Absence of Violence/Terrorism, ranking below the 10th percentile.[15]

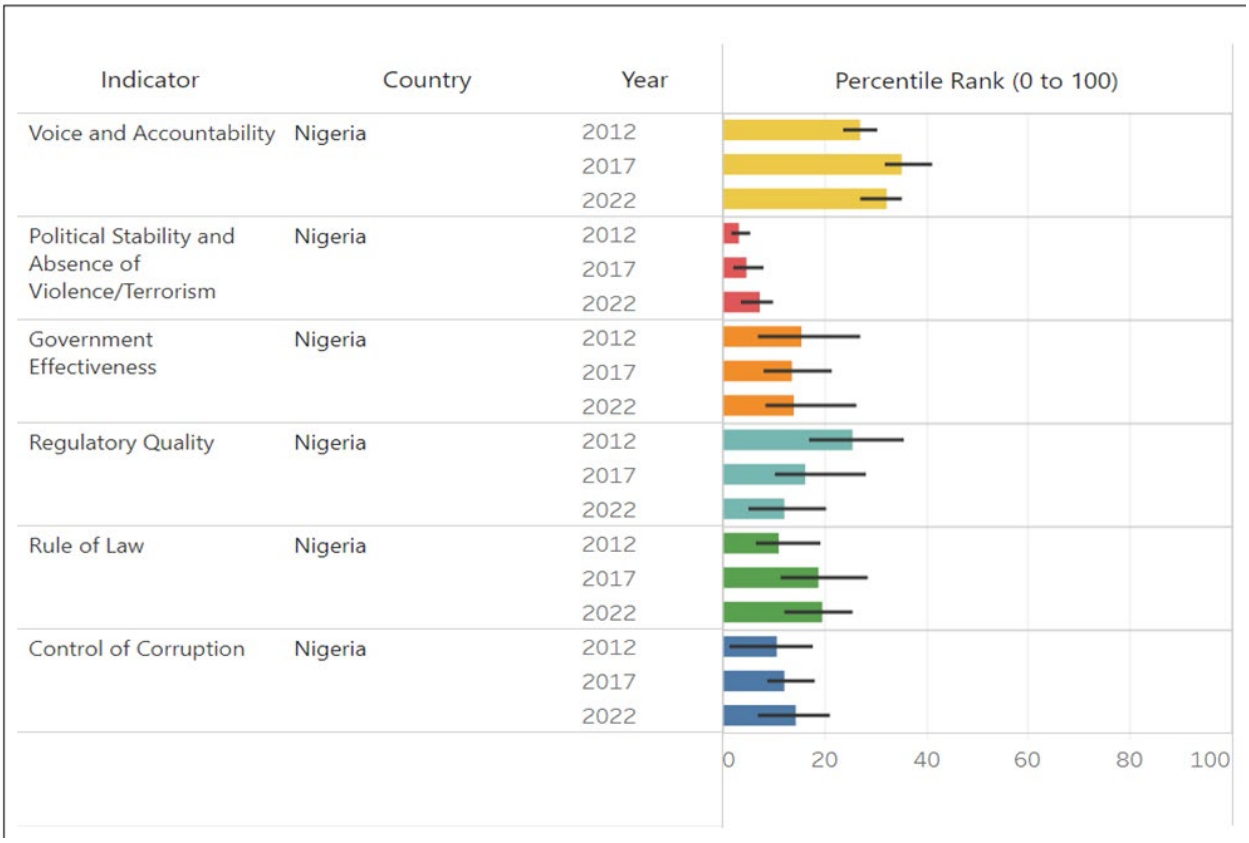


Figure 4. Nigeria's percentile rankings across the World Bank's Worldwide Governance. *Source:*[15]

D. Economy and Employment

Nigeria's economy is one of the largest in Africa and is largely driven by its export sectors, particularly hydrocarbons.[16] Crude petroleum is the country's leading export, valued at approximately USD 52.1 billion annually and accounting for a substantial share of gross domestic product (GDP).[16] Other major exports include petroleum gas (USD 9.04 billion), nitrogenous fertilizers (USD 2.0 billion), refined petroleum (USD 1.04 billion), and gold (USD 806 million).[16]

Nigeria's import profile is similarly dominated by energy-related products, with refined petroleum representing the largest import (USD 20.7 billion annually).[16] Additional key imports include wheat (USD 3.03 billion), automobiles (USD 1.24 billion), broadcasting equipment (USD 852 million), and medical supplies (USD 845 million).[16] Major trading

partners include China (USD 21.4 billion), Belgium (USD 7.72 billion), the Netherlands (USD 6.47 billion), India (USD 5.43 billion), and the United States (USD 3.24 billion).[16]

Nigeria receives substantial international funding to support public health initiatives, particularly in the control of infectious diseases.[16] Major global health programs include the Global Fund to Fight AIDS, Tuberculosis, and Malaria; the U.S. President's Emergency Plan for AIDS Relief (PEPFAR); and the Global Polio Eradication Initiative.[7] The World Bank Group plays a key role in coordinating and financing these efforts.[7]

Key development partners include multilateral organizations and bilateral agencies such as the African Development Bank (AfDB), the European Union (EU), the International Monetary Fund (IMF), and several United Nations agencies, including the United Nations Development Programme (UNDP) and UNICEF.[7] Additional contributors include the Agence Française de Développement (AFD), the German Development Bank (KfW), the Japan International Cooperation Agency (JICA), the UK's former Department for International Development (DFID), and the Bill & Melinda Gates Foundation.[7]

Nigeria's labor force reflects its lower-middle-income status, with persistent structural unemployment and underemployment.[17] In 2023, approximately 60.5 million individuals were unemployed.[17] Regional variation is notable, with higher unemployment rates reported in Abia (19%), the Federal Capital Territory (13%), and Rivers State (14%), compared with lower rates in Lagos State (5.5%).[17]

Despite these disparities, the national unemployment rate declined from 5.74% in 2020 to 3.07% in 2023.[17] However, poverty remains widespread, with 30.9% of the population living on less than USD 2.15 per day.[18] Although the federal minimum wage increased from ₦30,000 in 2020 to ₦70,000 in 2024, real income gains have been limited due to inflation and currency devaluation.

E. Physical and Technological Infrastructure

According to the Information and Communication Technology (ICT) Development Index, Nigeria's digital infrastructure demonstrates a gap between network availability and utilization. As of June 2024, approximately 80.9% of the population had access to 4G/LTE mobile coverage; however, only 35.5% of individuals were active internet users.[19] Mobile broadband penetration remains limited at 41.4 subscriptions per 100 people, despite relatively

high mobile phone ownership (78.5%).[19] These findings highlight a significant disconnect between access to mobile networks and effective digital engagement.

Access to reliable electricity remains a major constraint. As of 2022, approximately 60.5% of the population had access to electricity, with marked disparities between urban (89%) and rural (27%) areas.[7] Electricity generation is predominantly derived from natural gas (79%), followed by hydropower (20%), with minimal contribution from coal (<1%).[7] Despite this capacity, frequent and widespread power outages persist, reflecting structural inefficiencies within the energy sector.

Nigeria's transportation system is heavily dependent on its road network, which carries over 90% of freight and passenger traffic.[20] The network spans approximately 200,000 km and is distributed across federal (18%), state (16%), and local (66%) jurisdictions, with the majority consisting of unpaved roads.[20] Federal roads bear a disproportionate share of traffic, accounting for more than 70% of total vehicle flow.[20] Only about 31% of the road network is paved, and road conditions vary widely, often limiting access to essential services, including healthcare.[20] Public transportation remains the primary mode of travel for much of the population.[20]

Rail infrastructure is comparatively underdeveloped, with a total network length of approximately 3,798 km and low rail density relative to global standards.[21] In contrast, air transport infrastructure includes 19 airports, with four major international hubs – Lagos, Abuja, Kano, and Port Harcourt – handling the majority of domestic and international air traffic.[22] The condition of these roads varies widely, ranging from good to poor. Only about 31% of the network is paved with asphalt. Furthermore, traffic flows to the right.[20] One major challenge is the poor state of many roads, which limits access to vital social services and healthcare, with local public transportation being the most common mode of travel.

II. FOCUSED REVIEW ON NATIONAL HEALTHCARE

A. National Health Profile

Nigeria's health system faces a dual burden of disease, characterized by persistent infectious diseases, alongside a rising prevalence of non-communicable diseases. Despite modest progress, overall health indicators remain suboptimal, reflecting ongoing public health challenges. Table 2 summarizes key health indicators across selected years.

Life expectancy at birth has improved substantially, increasing by approximately 9.3 years, from 54.1 years (95% CI: 53.1–55.0) in 2000 to 63.4 years (95% CI: 62.4–64.6) in 2021 (Figure 5).[6] According to the World Health Organization (WHO, 2021), the leading causes of death (Figure 6) fall into four major categories: communicable, maternal, perinatal, and nutritional conditions, which together account for 64% of all deaths. Non-communicable diseases contribute 28%, while injuries account for 8%. COVID-19 and related outcomes represent a relatively small proportion of total mortality (~0.8%).[6]

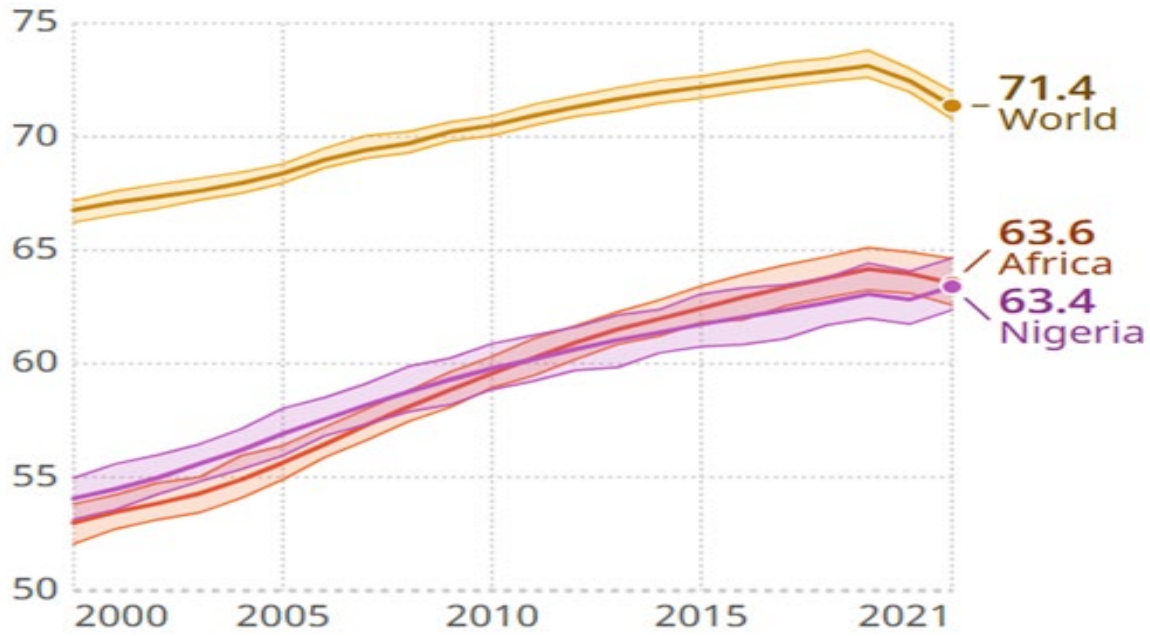


Figure 5. Trends in life expectancy at birth in Nigeria compared with Africa and global averages, 2000-2021. *Source:*[6]

Maternal and child health indicators in Nigeria have shown modest improvement, although outcomes remain among the highest globally. The maternal mortality ratio declined from 1,200 per 100,000 live births in 2015 to 993 per 100,000 in 2023.[6] Similarly, the neonatal mortality rate decreased by approximately 7%, from 37.2 to 34.3 per 1,000 live births over the same period.[6]

In contrast, the burden of infectious diseases remains substantial. Malaria incidence has increased over the past eight years, rising from 283 to 299 cases per 1,000 population at risk.[6] Tuberculosis incidence has also risen over the past decade.[6] However, progress has been observed in HIV control, with the rate of new infections declining from 0.6 to 0.3 per 1,000 uninfected individuals.[6]

Nigeria also carries a high burden of neglected tropical diseases (NTDs). Four of the five major NTDs – lymphatic filariasis, schistosomiasis, soil-transmitted helminthiasis, and trachoma – are endemic.[7] Additional NTDs of public health importance include human African trypanosomiasis (gambiense), cutaneous leishmaniasis, Buruli ulcer, taeniasis and cysticercosis, leprosy, and rabies.[7]

Table 2. Comparison of key health indicators in Nigeria, 2015-2023[6-7]

Health Indicators	2015	2020	2022	2023
Neonatal mortality rate (per 1,000 live births)	37.1	35.4	34.3	33.7
Infant mortality rate (per 1,000 live births)	70	65	62	60
Under-5 mortality rate (per 1,000 live births)	126.4	114.4	108.1	104.9
Maternal mortality ratio (per 100,000 live births)	1200	1100	1000	992.8
Life expectancy at birth (years)	61	62	—	—
Stunting prevalence in children <5 years (%)	36.7	35	34.2	39.5
Wasting prevalence in children <5 years (%)	7.3	6.5	—	—
Malaria incidence (per 1,000 population at risk)	283.8	304.4	299	299
Tuberculosis incidence (number of cases)	418,000	469,000	489,000	499,000
New HIV infections (per 1,000 uninfected population)	0.6	0.4	0.3	0.3

Nigeria experiences recurrent public health outbreaks, predominantly driven by infectious diseases, including mpox (monkeypox), Lassa fever, diphtheria, meningitis, and cholera.[23] These patterns are closely associated with socioeconomic factors, including widespread poverty and variable access to healthcare services.[24] International funding and targeted public health initiatives have contributed to substantial reductions in morbidity and mortality from HIV, tuberculosis, malaria, and polio.[24] Nigeria has also begun domestic implementation of the Sustainable Development Goals (SDGs), with individual states adapting these frameworks at varying rates.

Trends in disability-adjusted life years (DALYs) further illustrate the evolving burden of disease (Figure 7). DALYs attributable to communicable diseases, including HIV/AIDS and diarrheal illnesses, have declined by more than 50% since 2000.[25] In contrast, DALYs related

to non-communicable diseases, such as diabetes and Alzheimer's disease, have more than doubled between 2000 and 2021.[25]

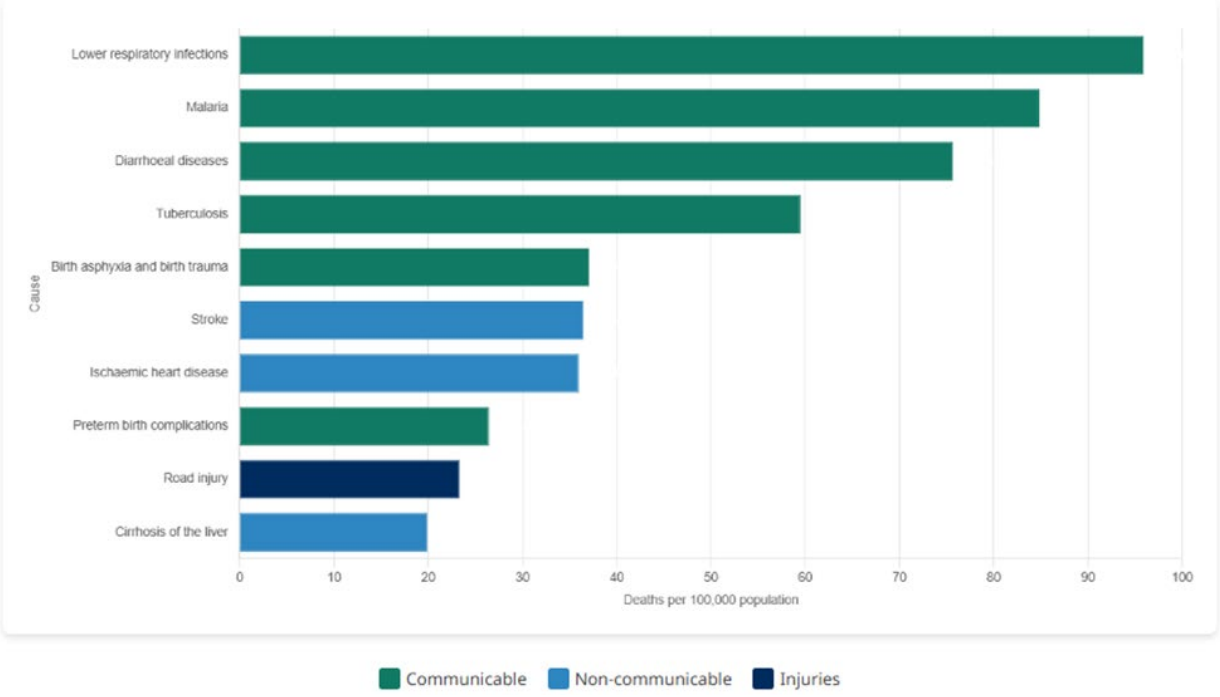


Figure 6. Top 10 causes of death in Nigeria in 2021. *Source:*[25]

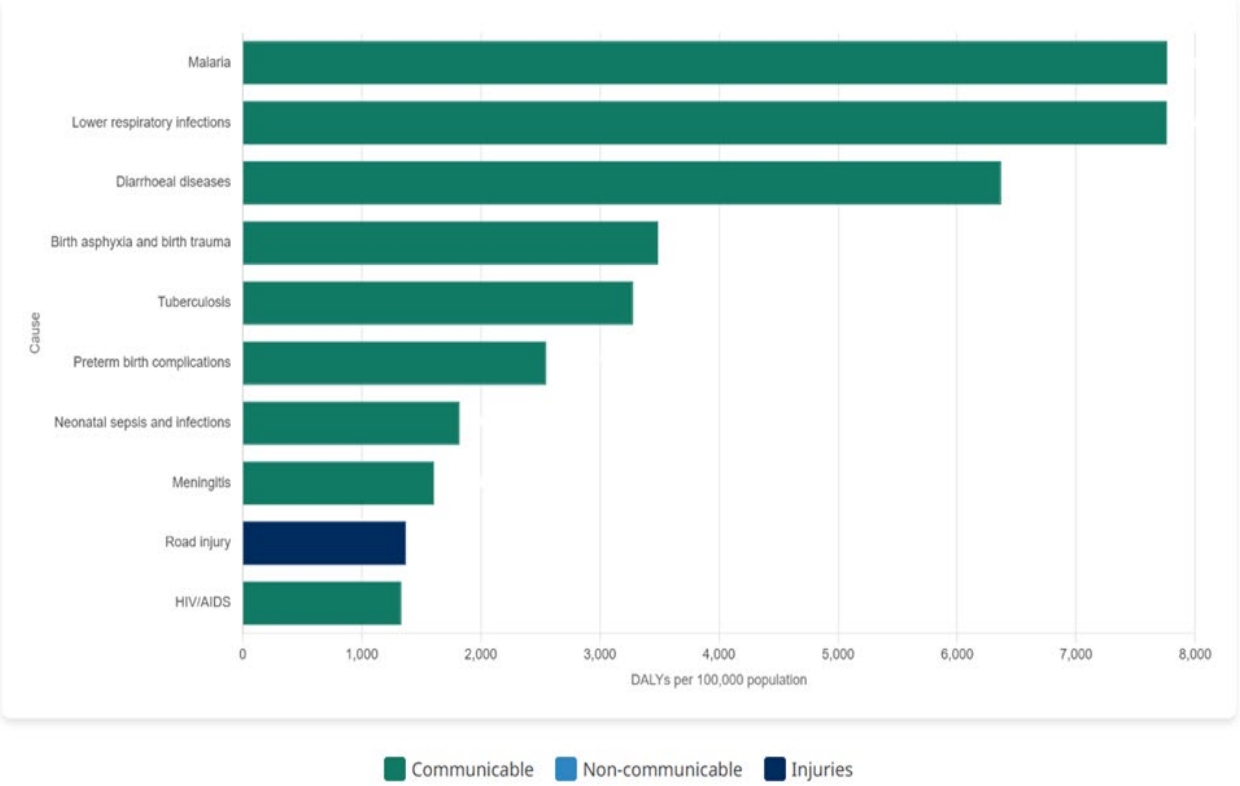


Figure 7. Top 10 causes of disability-adjusted life years (DALYs) in Nigeria in 2021. *Source*[25]

B. National Healthcare Structure

Nigeria's healthcare system faces significant structural challenges, including deteriorating infrastructure, insufficient government funding, low healthcare worker remuneration, and the ongoing emigration of skilled professionals. These factors have contributed to increased medical tourism, particularly to the United Kingdom and the United States. In 2021, healthcare expenditure accounted for only 5.18% of the national budget (₦2.48 trillion), falling well below the 15% target established in the 2001 African Union Abuja Declaration.[26] Table 3 summarizes trends in healthcare financing over time.

Marked disparities in health outcomes persist across regions, particularly between urban and rural populations and among different socioeconomic groups.[27] Responsibility for healthcare delivery is distributed across three tiers of government – federal, state, and local – while regulatory oversight remains primarily under federal jurisdiction.[27]

The federal government provides policy direction, strategic planning, and technical support, and oversees the implementation of national health programs.[27] It is responsible for disease surveillance, pharmaceutical regulation, vaccine management, and the training of healthcare professionals.[27] Additionally, the federal government manages teaching hospitals and specialized medical centers.[27]

State governments are responsible for secondary healthcare services, including general hospitals, and in some cases contribute to tertiary and primary care provision.[28] However, these facilities are disproportionately concentrated in urban areas, contributing to reduced access in rural regions.[28] States also oversee the training of mid-level healthcare workers, including nurses, midwives, and technical staff.[28]

Local governments are tasked with delivering primary healthcare services, including community health programs, sanitation, and preventive care.[27] Due to limitations within the public healthcare system, the private sector – including both for-profit and non-profit organizations – as well as traditional and spiritual healers, plays a significant role in healthcare delivery.[27] Public-private partnerships are increasingly utilized to expand healthcare capacity and service delivery.

Table 3. Trends in healthcare financing in Nigeria, 2009-2022[7]

Health Indicators	2009	2015	2020	2022
Current health expenditure (% of GDP)	3.6	3.5	3.4	4.3
Private health expenditure (% of total)	77.9	73.6	75.5	78.7
Public health expenditure (% of total)	15.9	16.5	14.9	14.5
Total health expenditure (USD per capita)	65.7	92.9	67.9	90.9
Out-of-pocket expenditure (USD per capita)	124.6	132.7	126.3	186.7
External health expenditure (USD per capita)	10.4	18.3	16.2	16.6

The Nigerian government is actively working to expand health insurance coverage as part of its efforts to achieve universal health coverage through the National Health Insurance Scheme (NHIS), established on June 6, 2005.[29] The NHIS comprises three primary programs, with the formal-sector social health insurance program accounting for the largest proportion of enrollees.[29] This program provides coverage for primary and referral care at accredited healthcare facilities.[29] In contrast, community-based health insurance schemes are designed to serve low-income populations, particularly in rural areas, although their coverage and implementation vary significantly across regions.[29]

The NHIS is structured to incorporate preventive, promotive, and curative healthcare services[29]. In addition, state-supported health insurance initiatives aim to increase regional participation in the implementation of social health insurance.[29] Private insurance plans, administered by Health Maintenance Organizations (HMOs), primarily serve individuals who can afford coverage and typically include primary care along with selected secondary and tertiary services.[29]

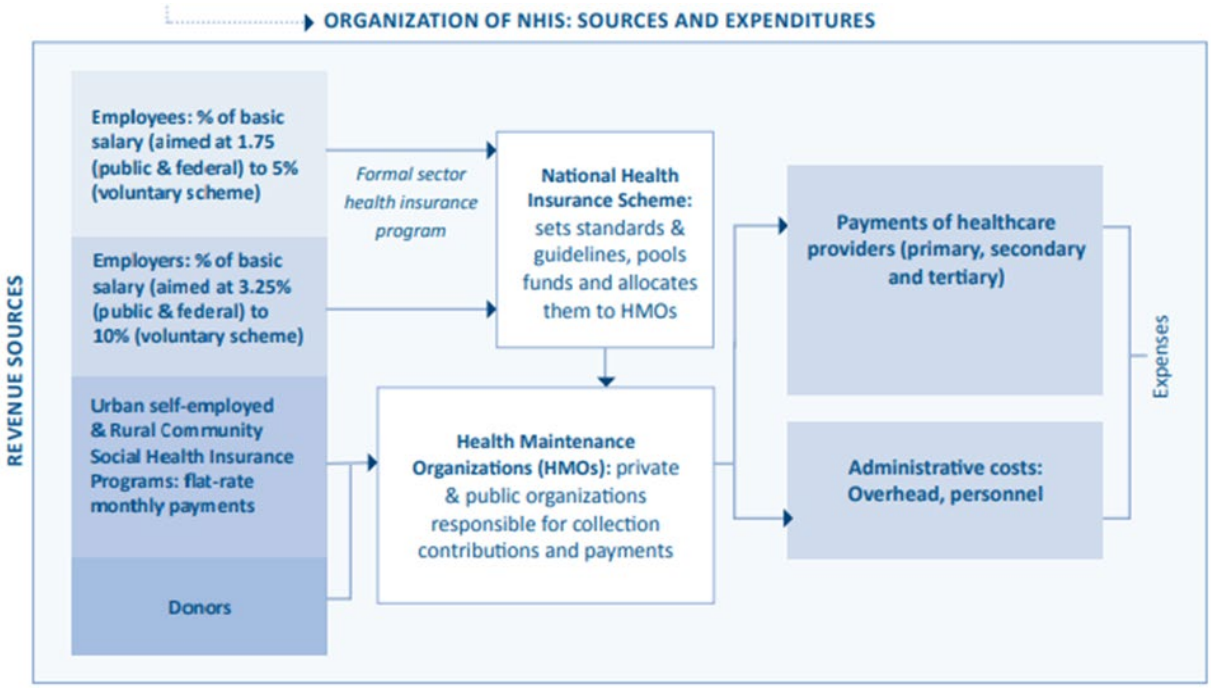
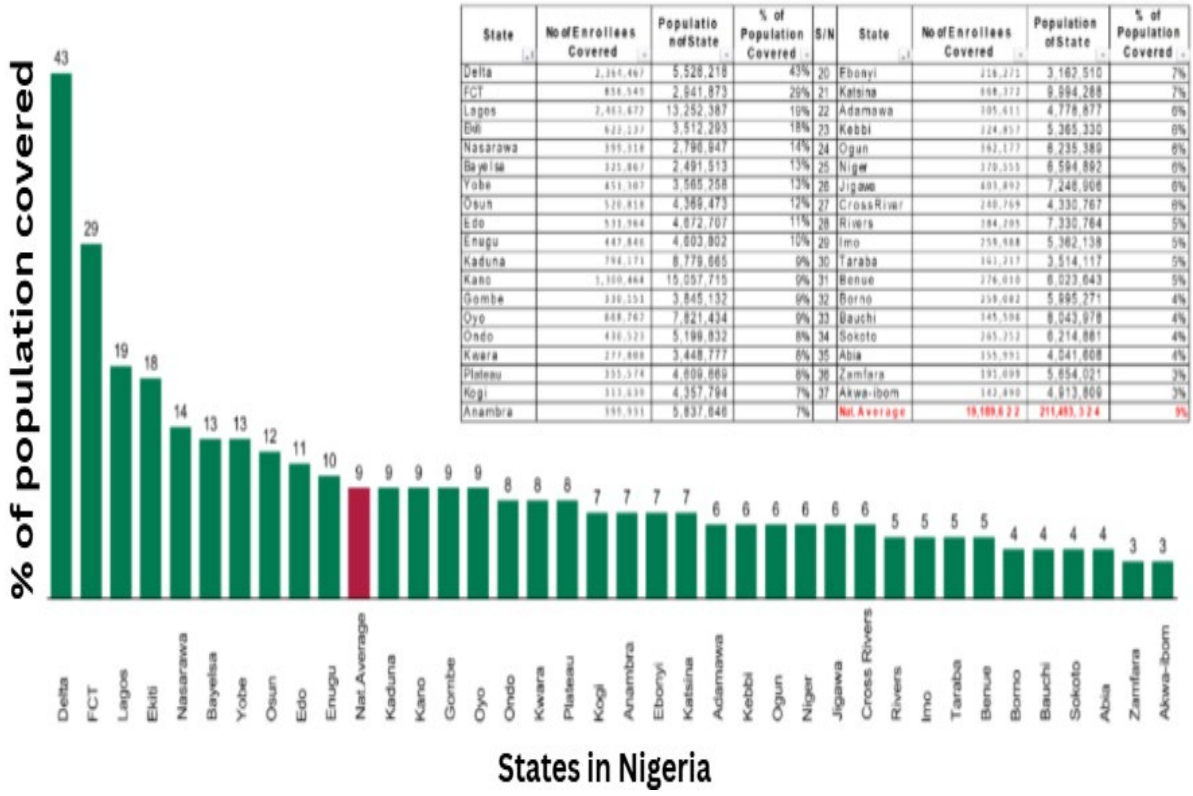


Figure 8. Organization of Nigeria's National Health Insurance Scheme (NHIS).
Source:[29]

The NHIS is funded through contributions from employees and employers within the formal sector, as well as flat-rate payments from community-based and self-employed populations, supplemented by donor support.[30] Pooled funds are managed centrally and distributed to HMOs, which are responsible for coordinating payments to accredited healthcare providers across primary, secondary, and tertiary levels.[30] Expenditures include both provider reimbursements and administrative costs such as personnel and system overhead.[29]



State	No of Enrollees Covered	Population of State	% of Population Covered	S/N	State	No of Enrollees Covered	Population of State	% of Population Covered
Delta	2,360,467	5,528,218	43%	20	Ebonyi	216,271	3,162,510	7%
FCT	838,540	2,841,873	29%	21	Katsina	668,372	9,894,288	7%
Lagos	2,463,673	13,252,387	19%	22	Adamawa	305,611	4,778,877	6%
Ekiti	622,237	3,512,293	18%	23	Kebbi	324,857	5,365,330	6%
Nasarawa	399,316	2,796,847	14%	24	Ogun	362,177	6,235,380	6%
Bayelsa	323,867	2,491,513	13%	25	Niger	370,355	6,594,862	6%
Yobe	453,307	3,565,258	13%	26	Jigawa	493,892	7,248,006	6%
Osun	520,818	4,368,473	12%	27	CrossRiver	248,769	4,330,767	6%
Edo	533,964	4,672,707	11%	28	Rivers	384,295	7,330,764	5%
Enugu	447,846	4,603,802	10%	29	Imo	259,988	5,362,139	5%
Kaduna	794,171	8,779,665	9%	30	Taraba	161,217	3,514,117	5%
Kano	1,300,464	15,057,715	9%	31	Benue	276,010	6,023,643	5%
Gombe	330,153	3,645,132	9%	32	Borno	259,082	5,695,271	4%
Oyo	669,767	7,621,434	9%	33	Bauchi	345,596	8,043,978	4%
Ondo	480,523	5,199,832	8%	34	Sokoto	265,252	6,214,861	4%
Kwara	277,880	3,448,777	8%	35	Abia	155,991	4,041,608	4%
Plateau	355,574	4,809,869	8%	36	Zamfara	193,695	5,654,021	3%
Kogi	333,639	4,357,794	7%	37	Akwa-Ibom	142,890	4,913,809	3%
Anambra	399,931	5,837,846	7%		Nat.Average	19,189,622	211,493,324	9%

Figure 9. State-level variation in health insurance coverage across Nigeria. *Source:* [31]

Health facilities in Nigeria are classified into three subcategories: government-owned, privately owned for-profit, and faith-based institutions.[31] Government-owned facilities constitute the majority (73.8%), while privately owned facilities account for 26.2%.[31] Despite this, private facilities deliver approximately 60% of healthcare services nationwide, reflecting a significant reliance on the private sector for care delivery.[31]

As of 2024, Nigeria has a total of 40,184 health facilities registered in the Federal Ministry of Health (FMoH) database.[31] These are predominantly primary healthcare centers, which comprise 31,815 facilities (79.17%), followed by 8,128 secondary facilities (20.22%) and only 241 tertiary facilities (0.59%).[31]

The distribution of health facilities by state (see Figure 10) reveals geographic variability, with Lagos having the highest number of facilities, followed by Niger and Katsina. In parallel, healthcare workforce capacity remains limited; Nigeria's doctor-to-population ratio is 2.9 per 10,000, substantially below the WHO recommendation of 17 per 10,000.[31]

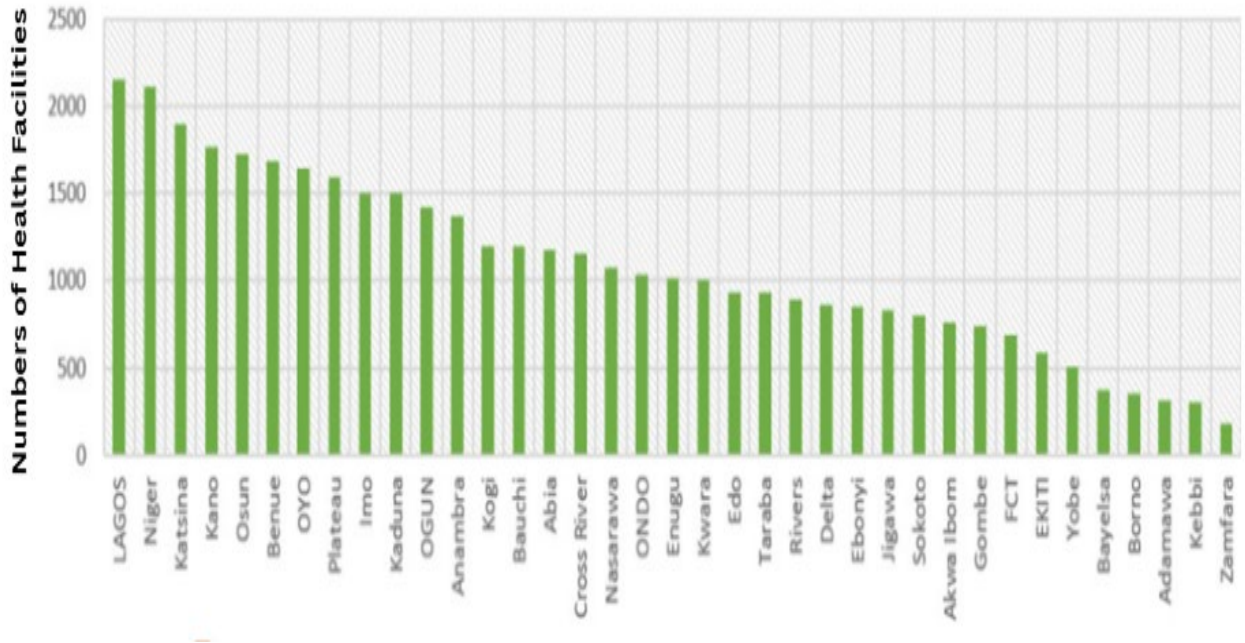


Figure 10. Distribution of health facilities across Nigerian states. *Source:*[31]

III. RADIOLOGY IN NIGERIA

A. Radiology Workforce and Training and Professional Representation

The field of radiology in Nigeria has experienced notable growth over the past decade since the publication of the previous national report in 2010. Radiologists are now increasingly trained locally to interpret medical imaging studies and perform image-guided procedures. In addition to clinical responsibilities, radiologists often assume leadership and administrative roles within healthcare systems.

Despite these advancements, the provision of imaging services remains heterogeneous. Imaging modalities – including ultrasound, conventional radiography, and image interpretation –are delivered by both certified and uncertified personnel. Regulatory oversight has not fully addressed this variability, and non-certified practice persists in certain settings.

Radiographers play a central role in image acquisition and are primarily responsible for performing radiographic studies. In some private-sector settings, radiographers also undertake

fluoroscopic procedures. Technicians provide auxiliary support, particularly in resource-limited environments, assisting with equipment operation and image acquisition.

Biomedical engineers and medical physicists play essential supporting roles in radiology systems. Biomedical engineers are responsible for equipment maintenance and repair, while medical physicists oversee radiation safety, quality control, and dose optimization.[32]

Radiologists

As of 2025, Nigeria has an estimated 250-400 radiologists, corresponding to approximately one radiologist per 658,000 people.[33] This figure likely overestimates the active workforce due to outdated registration records and ongoing emigration to higher-income countries.

Professional regulation and training are overseen by the West African College of Surgeons (WACS) and the National Postgraduate Medical College of Nigeria (NPMCN), which accredit training institutions and administer certification.[34] Interventional radiology is supported by the Nigerian Society of Interventional Radiologists (NiSIR), founded in 2016, along with initiatives such as IRDOC Nigeria and collaborations with organizations including RAD-AID.[34] These programs emphasize procedural training, including complex interventions such as transjugular intrahepatic portosystemic shunts (TIPS).[34]

Radiology training requires a minimum of 48 months of structured clinical education, followed by a three-stage examination process (primaries, Part I, and Part II/Fellowship) and completion of a supervised research thesis.[32] Despite this structured pathway, subspecialty fellowship opportunities remain limited, reflecting the early stage of subspecialization within the country.[32]

Nuclear Medicine and Radiation Oncology Workforce

Nigeria's first nuclear medicine facility was established in 2006 at University College Hospital, Ibadan, with support from the International Atomic Energy Agency (IAEA). Currently, both public and private facilities operate under the Nigerian Nuclear Regulatory Authority (NNRA).[35]

A 2021 survey of government-owned centers reported 44 radiation oncologists, 44 medical physicists, 57 oncology nurses, 15 biomedical engineers, and only eight nuclear

medicine physicians nationwide.[36] Data from private-sector facilities remain limited. Notably, none of the private centers offer medical physics residency training, and radiation oncology residency programs are available in only a few institutions, often requiring collaboration due to resource constraints.

Radiographers and Technical Workforce

Radiographers form the backbone of imaging service delivery, with approximately 1,578 licensed practitioners as of 2025 under the Radiographers Registration Board of Nigeria (RRBN).[37] They operate across both public and private healthcare settings and are primarily responsible for image acquisition.

Technicians provide additional operational support, particularly in resource-limited settings, assisting with imaging workflows and equipment handling.

Medical Physicists

There are over 250 registered medical physicists in Nigeria, with approximately 70 practicing clinically.[38] Most are concentrated in radiotherapy and oncology services, with fewer involved in diagnostic imaging or nuclear medicine. Although around eight universities offer medical physics training, these programs generally lack formal clinical or residency components.[38] The Nigerian Association of Medical Physicists (NAMP) serves as the primary professional body overseeing the field.[38]

B. Equipment Inventory, Distribution, and Rules and Regulations

Since the publication of the previous national report, radiologic services in Nigeria have expanded in scope; however, access remains uneven and constrained by infrastructure limitations. Ultrasound and conventional radiography continue to be the most widely utilized imaging modalities due to their relative affordability, availability, and accessibility. Major suppliers of imaging equipment include Siemens, General Electric, Philips, and Fujifilm.

Radiographic Services

Nigeria has an estimated 5,000 X-ray machines nationwide.[32] Despite this relatively large number, the proportion of operational units remains unclear, reflecting gaps in equipment monitoring and maintenance systems.

Fluoroscopy

The total number of fluoroscopy units is not well documented. Most units are concentrated in public tertiary hospitals, with limited availability in private urban centers. Frequent equipment malfunction and prolonged repair times contribute to inconsistent service availability.[32]

Mammography

Mammography services are primarily located in public tertiary institutions, with additional capacity in private diagnostic centers. Operational status varies, and access is often supplemented by non-governmental breast cancer screening initiatives aimed at improving utilization.[32]

Computed Tomography (CT)

CT capacity remains limited relative to population needs. As of 2021, Nigeria had 183 CT scanners, with a majority (57.4%) owned by private investors and 42.6% by government entities.[39] Most systems are low- to mid-slice (2–64 slice), with only two 640-slice scanners available nationwide.[32] Updated national data remain limited.

Magnetic Resonance Imaging (MRI)

MRI availability is similarly constrained. As of 2016, there were 58 MRI units in the country[40], predominantly 1.5T systems,[41] with no reported 3T scanners. These units are heavily concentrated in urban areas, particularly Lagos, which accounts for approximately 25% of installed capacity.[41] The majority are privately owned.[41]

Angiography and Interventional Infrastructure

Angiographic services are restricted to a small number of tertiary centers, including University College Hospital (Ibadan), Aminu Kano Teaching Hospital, and University of Maiduguri Teaching Hospital.[32] Dedicated angiographic suites support interventional procedures;[42] however, limited infrastructure and equipment shortages constrain broader adoption of interventional radiology.

Nuclear Medicine and Radiotherapy Equipment

Radiotherapy and nuclear medicine infrastructure remain critically limited. Despite a population exceeding 200 million, only a small number of radiotherapy machines are operational nationwide – far below the estimated need. Government facilities collectively operate a limited number of linear accelerators and teletherapy units,[36] while nuclear medicine capacity is restricted, with only a few centers offering SPECT and a single private facility providing PET/CT services.[36]

Digital Infrastructure (PACS, AI, and Teleradiology)

No prior information exists regarding the installation and utilisation of PACS before the RAD-AID global health outreach project, which involved installing PACS at UCH in September 2019.[43] Digital radiology infrastructure is still developing. Picture Archiving and Communication Systems (PACS) systems are available in select tertiary and private centers but are not widely implemented. Artificial intelligence applications remain limited, with early use cases such as tuberculosis detection on chest radiographs.[42] Teleradiology platforms – both regional and international – are increasingly utilized to mitigate radiologist shortages and reporting delays, although adoption remains incomplete.

C. Regulation and Policy

Radiologic practice in Nigeria is governed by multiple regulatory bodies responsible for ensuring safety, professional standards, and compliance with international guidelines. The NNRA serves as the primary body overseeing radiological protection and nuclear safety.[37] Its mandate includes safeguarding life, health, property, and the environment from the harmful effects of ionizing radiation.[45] The NNRA is responsible for the registration, licensing, inspection, and enforcement of safety standards across all radiologic and nuclear practices in the country, while also ensuring compliance with international obligations related to the peaceful use of nuclear technology.[45]

Professional regulation of the radiologic workforce is similarly distributed across multiple institutions. The RRBN oversees the training, certification, and licensing of radiographers. Radiologists are regulated through postgraduate training institutions, including the WACS and the NPMCN in conjunction with the Medical and Dental Council of Nigeria (MDCN), which is responsible for licensure and professional oversight.

IV. CHALLENGES

Establishing a robust radiology infrastructure in Nigeria is hindered by multiple interrelated challenges spanning energy supply, equipment maintenance, regulatory enforcement, and workforce training.

A major constraint is the unreliable electricity supply, which directly affects the operation of imaging equipment. Consequently, many radiology facilities – both public and private – depend on diesel generators, substantially increasing the cost of imaging services and limiting affordability. In addition, digital infrastructure remains underdeveloped; many facilities lack functional PACS, Radiology Information Systems (RIS), or integrated workflow platforms. As a result, imaging data are often stored locally on films or discs, restricting accessibility, continuity of care, and longitudinal data management.

Equipment maintenance represents another critical barrier. The limited availability of trained biomedical engineers necessitates reliance on foreign technical support in many centers. Even when maintenance services are available, complex repair processes frequently result in prolonged equipment downtime – often extending from weeks to months – thereby disrupting service delivery and delaying patient care. Public-private partnerships are commonly employed to mitigate these challenges, particularly in government-owned facilities.

Regulatory enforcement remains inconsistent. While teaching hospitals and large private centers generally adhere to established standards, many facilities operate without adequate radiologist oversight. This shortage contributes to variability in image interpretation quality and, in some cases, substandard reporting, particularly in high-volume modalities such as ultrasound and conventional radiography. Although the NNRA is tasked with ensuring radiation safety, quality control, and standardization of practice, enforcement capacity remains limited in certain settings.

Finally, workforce training continues to face structural limitations. Although radiology residency programs are expanding, the availability of trained faculty, modern equipment, and subspecialty training opportunities remains insufficient. This constrains the ability of radiologists, radiographers, medical physicists, nurses, and biomedical engineers to acquire comprehensive practical skills and limits the development of advanced radiologic services.

V. CONCLUSION

Radiology services in Nigeria have experienced notable growth since the publication of the previous national report, with expansion in workforce training, service delivery, and imaging capabilities. However, persistent gaps in data availability – particularly regarding equipment functionality and workforce distribution – continue to limit a comprehensive understanding of the national radiology landscape.

Significant structural challenges remain, including inadequate infrastructure, limited availability of advanced imaging modalities, workforce shortages, and inconsistent regulatory enforcement. Addressing these issues will require strengthening the role of the NNRA in standardizing protocols, expanding accreditation activities, and ensuring compliance with safety and quality standards across all radiologic practices.

In parallel, sustained investment in workforce development, equipment maintenance systems, and digital infrastructure will be essential. Strategic international collaborations should be pursued not only to support resource acquisition but also to facilitate knowledge transfer, local capacity building, and the development of domestic expertise in equipment manufacturing and biomedical engineering.

Ultimately, coordinated efforts across policy, infrastructure, workforce training, and regulation will be necessary to build a more equitable, efficient, and sustainable radiology system capable of meeting the growing healthcare needs of Nigeria's population.

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